

Laser Safety in the UK Ministry of Defence

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Abstract

In the United Kingdom (UK) the Military Laser Safety Committee (MLSC) is responsible for the safe use of all lasers within the UK Ministry of Defence (MOD). This includes lasers used by the Armed Services and other non-agencies for, for example, rangefinding and target designation, both in training and during operations, lasers when repaired in workshops, medical lasers, and those lasers used in research by the Defence Evaluation and Research Agency.

The MLSC is a tri-Service advisory board under the auspices of the Ordnance Board. Its function is to advise MOD departments on the technical and practical aspects of safety arising from the direct and indirect non-ionizing hazards to people from lasers and other optical devices which are in use, or being developed or considered for use, by any of the three Armed Services. The MLSC is responsible for assessing the hazards associated with the MOD use of lasers and other optical devices, advising the MOD on the levels of hazard and degree of risk involved in the use of such devices, and on the possible precautions to be taken against possible injury from them and for over two decades the MLSC has applied quantitative risk assessment (QRA) to the management of the risks involved with the use of airborne laser rangefinders and target designators. The MLSC also specifically issues Laser Safety Clearance Certificates authorizing the use of specific laser devices, and has a remit to sponsor research to support the development of laser safety.

The ever widening use of lasers and the spread of international involvement requires international agreement not only on classification, but also implementation of Laser Safety in the Military and civilian fields. Through representation on the National and International Standards Committees we are able to support International Standardization.

This paper will illustrate how laser safety is managed and implemented by the UK MOD, with specific reference to QRA techniques which have been developed to support the use of high energy laser systems in the field.

1. Introduction and Background

The use of lasers on United Kingdom (UK) Ministry of Defence (MOD) property is widespread and varies greatly, from the carefully controlled environment of the research laboratory to the numerous land and air ranges around the British Isles. It was felt necessary to have a single policy applicable to all involved with the use of lasers, drawing upon a number of scientific techniques for evaluating and quantifying laser hazards, depending upon the precise laser scenario. The requirement for a single policy led to the establishment of the Military Laser Safety Committee (MLSC), whilst the search for laser hazard evaluation techniques has resulted in the coexistence of deterministic and probabilistic models of laser safety in the UK MOD. This paper explores the rationale, roles and membership of the MLSC, discusses the need for a probabilistic model of laser safety on military ranges and outlines the principles that make up such a model.

2. Authority for Military Laser Safety in the UK

Responsibility for certification and approval of laser use on UK MOD property is vested in the Military Laser Safety Committee. The MLSC was set up within the Ordnance Board, by the MOD, in order to fulfill the wishes of the UK Armed Services and the UK Research Establishments to have a central, independent authority for laser safety. The MLSC is independent of the equipment procurement Project Managers and the Service users, so that its authority is not subjected to the pressures of the Project Manager who wishes to get an item of laser equipment into service on time and within budget. Its independence from the Service user also removes the pressure that may result from a military desire to use the laser equipment to its utmost technical performance limit. Thereby the authority (that is, the MLSC), although mindful of the desires of the Project Manager and the Service user, can ensure that the laser equipment is designed to be safe and that it is used safely.

A Vice President of the Ordnance Board chairs the MLSC at one-star level. The membership of the committee is broad, and includes representatives of land, sea and air interests, medical representation and a safety advisor, Marconi, as well as scientific input from independent authorities in the field, the UK government Defence Evaluation and Research Agency (DERA) and industry. Specific areas of responsibility are delegated to one of six subcommittees that report to the MLSC; Land, Air, Sea, Scientific, Medical and Documentation. It is planned that a Rotary-wing Aircraft Subcommittee will be added in the near future to address the laser complexities of the next combat helicopter to enter service in the UK, the Apache. The Medical Subcommittee is currently in abeyance, but it is planned to reestablish this body during the current year. Specialist tasks are allocated to Working Groups, which report to the Scientific Subcommittee. The structure of the MLSC is shown in Figure 1.

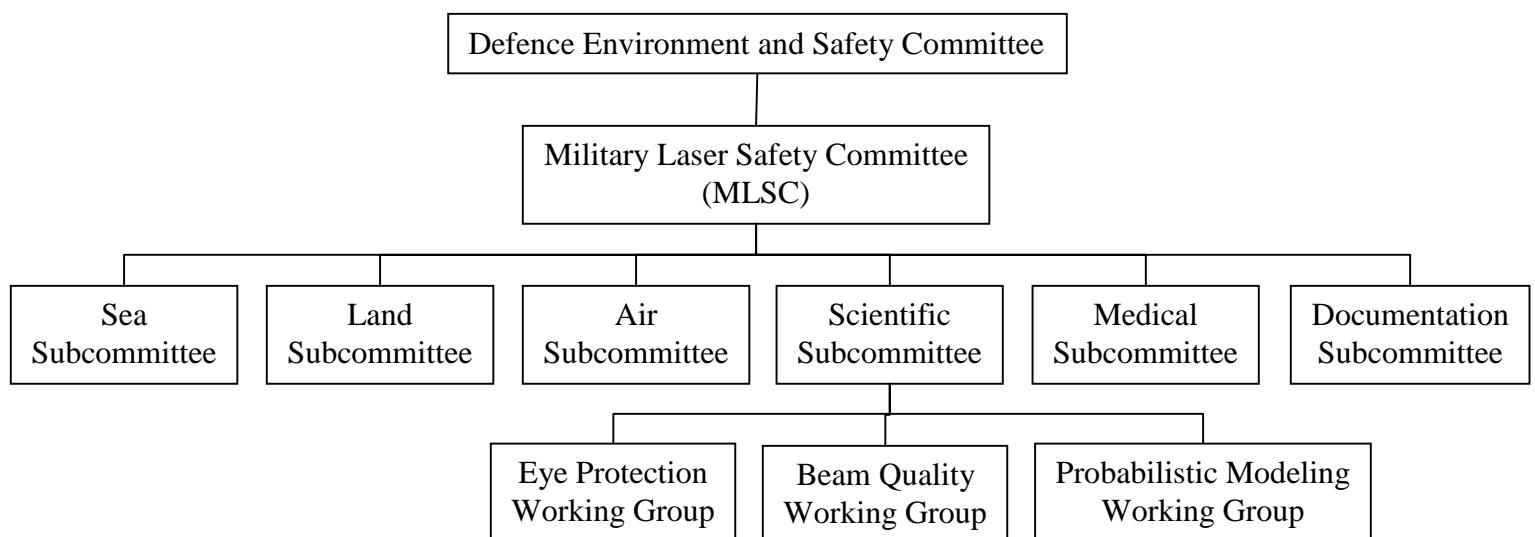


Figure 1 – Military Laser Safety Committee, Subcommittee and Working Group Structure

The MLSC is responsible for the content of the UK military laser safety manual, Joint Services Publication (JSP) 390, which contains the maximum permissible exposure (MPE) values for extended source and intra-beam viewing which are common to ISO 60825-1:1994 and ANSI Z136.1, but also includes guidelines for Quantitative Risk Analysis. These are based upon the principles that will be given to you by Dr. Harding. It also lays down regulations that must be adhered to within the MOD in order that lasers are used safely.

3. Military Laser Safety Committee – Terms of Reference

The terms of reference of the MLSC are as follows.

3.1 The primary responsibilities of the MLSC are to:

- a) Assess the hazards associated with the MOD use of lasers and other optical devices.
- b) Advise the MOD on the levels of hazard and degree of risk involved in the use of such devices, and on the precautions to be taken against possible injury from them.
- c) Issue Laser Safety Clearance Certificates authorizing the use of specific laser devices.
- d) Sponsor research studies or trials required for the development of laser safety.
- e) Maintain awareness of current developments in International laser standards.

3.2 In addition, the MLSC shall:

- a) Provide advice on the safety of lasers and other optical devices at the request of any MOD or appropriate agency, by tasking other parts of the MOD when necessary.
- b) Make any necessary arrangements for additional research or experimental work in the field of laser safety, where MLSC funding is not available.
- c) Collect information published on laser safety from authoritative national and international publications, and promulgate instructions as required.
- d) Maintain liaison with Service laser safety agencies in all other countries.
- e) Sponsor and maintain JSP 390 "Military Laser Safety", covering the military aspects of laser safety for mandatory use by all three armed services, MOD Defence Procurement Agency, DERA and others when on MOD property.
- f) Be the custodian of NATO Standardization Agreement (STANAG) 3606.
- g) Nominate delegates to NATO committees and other international agencies where laser safety is addressed.

4. Conclusions

The Military Laser Safety Committee has administered laser safety in the UK Ministry of Defence for some years. It has embraced expanding knowledge at the international level, whilst sponsoring the development of a probabilistic approach to Quantitative Risk Analysis (QRA) that is now finding wider acceptance in the laser safety community. QRA is based upon careful modeling of probabilistic parameters involved in a particular laser scenario, and relies upon an evaluation of acceptable risk that compares favourably with levels used in other industries.